Glencoe Science

Biology

Interactive Classroom

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Mc Graw Hill Glencoe

Chapter 18 Bacteria and Viruses

EXIT

Click on a lesson name to select.

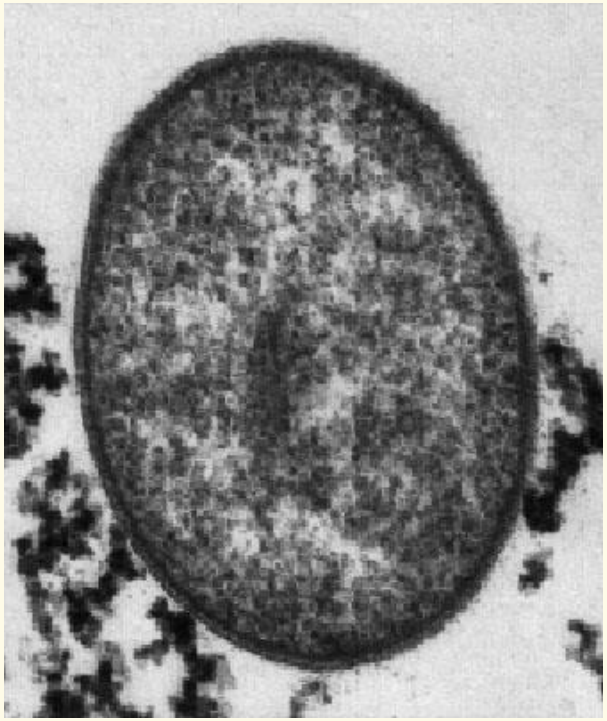
18.1 Bacteria

Diversity of Prokaryotes

- Bacteria are microscopic organisms that are prokaryotes.
- Prokaryotes are divided into two domains—the Domain Bacteria (eubacteria) and the Domain Archaea (archaebacteria).

18.1 Bacteria

Archaebacteria



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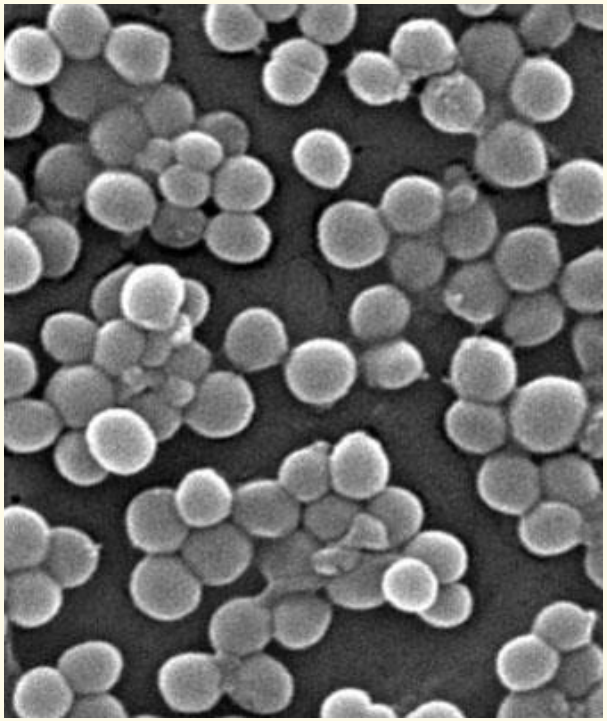
Eubacteria



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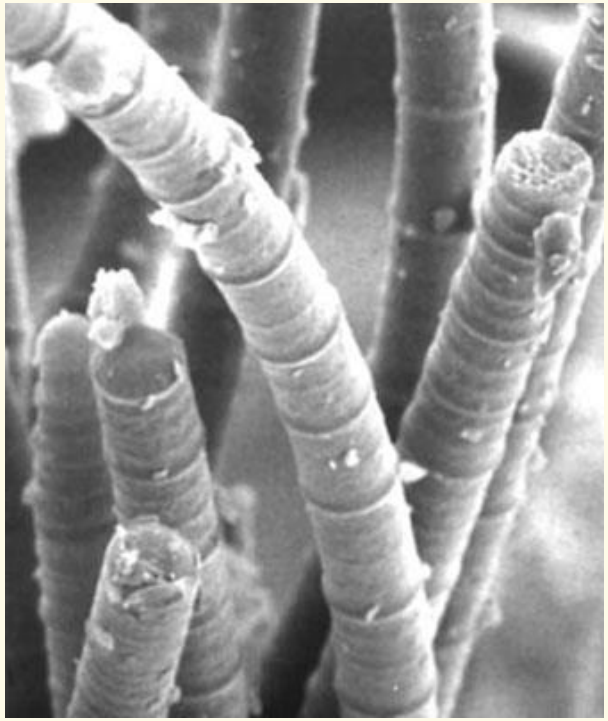
Photosynthetic eubacteria



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18.1 Bacteria

Eubacteria

- Very strong cell walls
- Contain peptidoglycan
- Some have a second cell wall

18.1 Bacteria

Archaebacteria

- Thermoacidophiles (thur muh uh SIH duh filz) live in hot, acidic environments.
- Halophiles (HA luh filz) live in very salty environments.
- Methanogens (meh THAHN oh jenz) cannot live in the presence of oxygen.

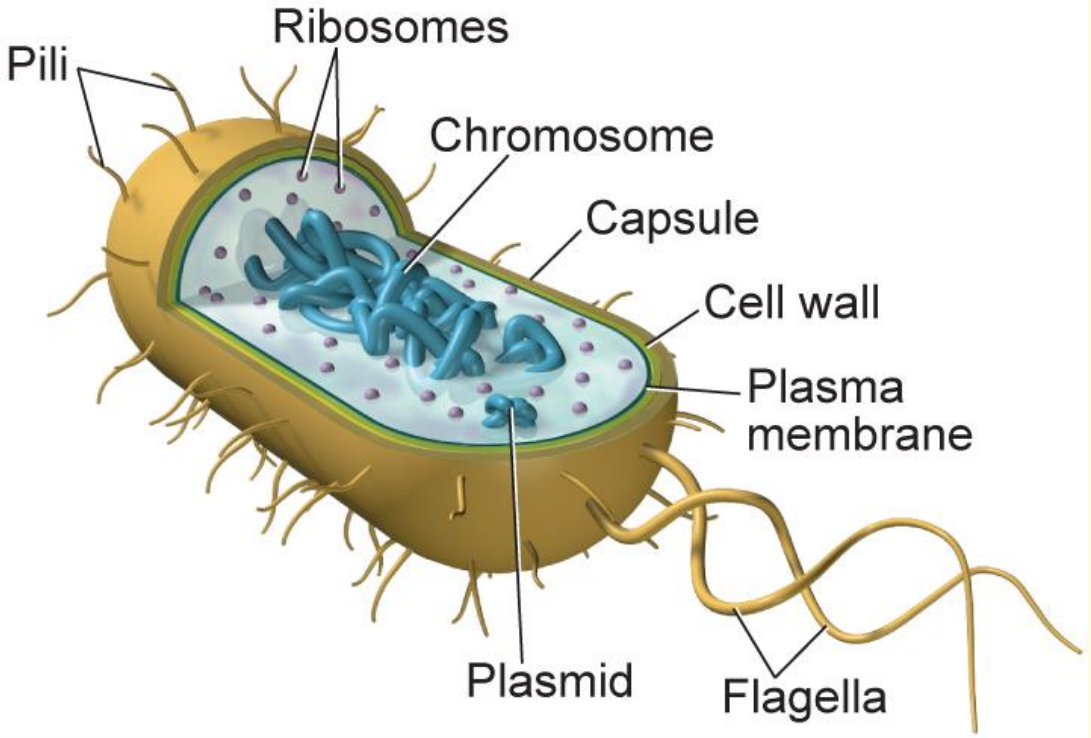
18.1 Bacteria

Differences Between Eubacteria and Archaebacteria

- The cell walls of the eubacteria contain peptidoglycan, but the cell walls of archaebacteria do not.
- The two groups of organisms have different lipids in their plasma membranes.
- Different ribosomal proteins and RNA

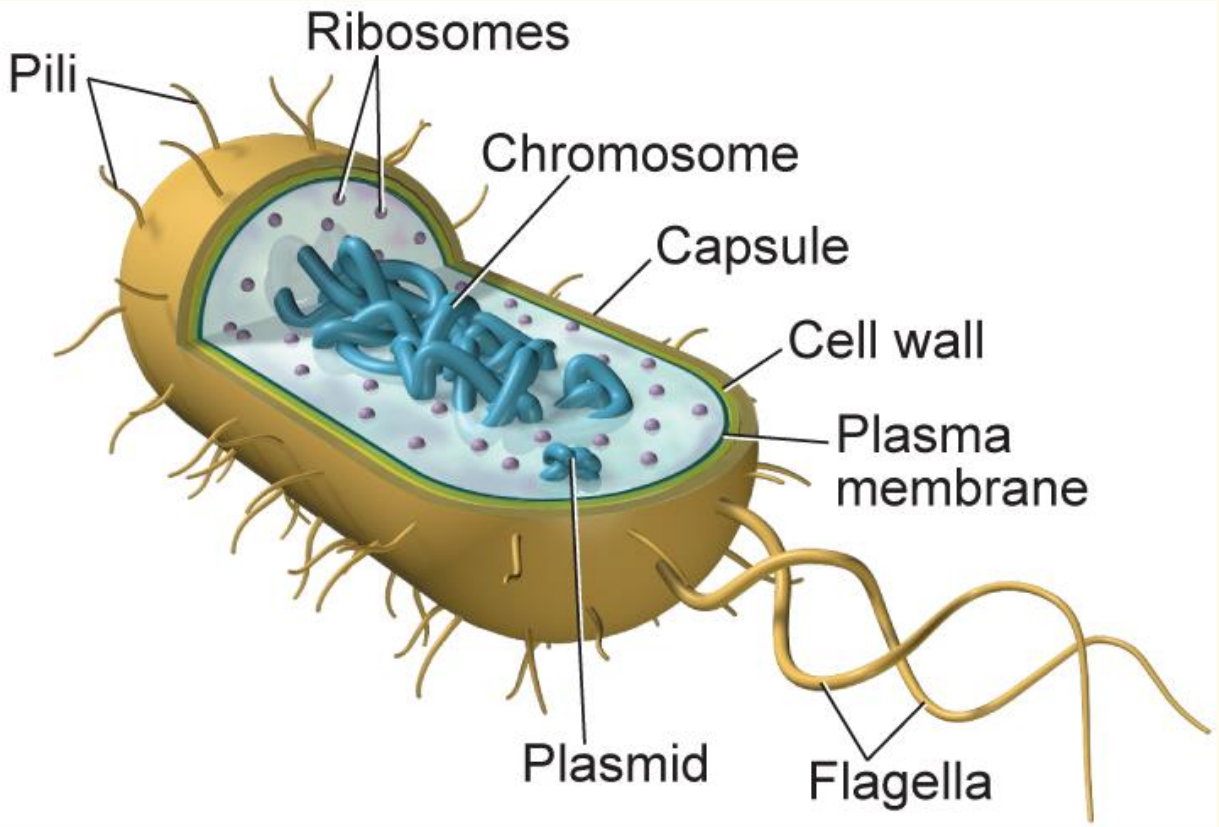
18.1 Bacteria

Prokaryote Structure



- Prokaryotes are microscopic, unicellular organisms.
- They have some characteristics of all cells, such as DNA and ribosomes.
- Lack a nuclear membrane and other membrane-bound organelles

18.1 Bacteria



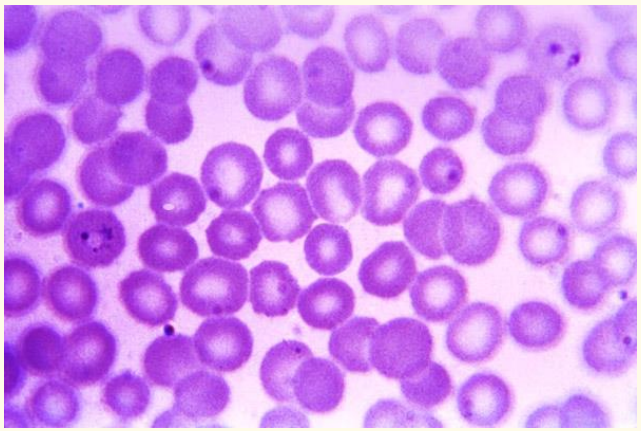
- Chromosomes
- Capsule
- Pili
- Size

18.1 Bacteria

Identifying Prokaryotes

- Shape
  - Spherical = Cocci
  - Rod-shaped = Bacilli
  - Spiral-shaped = Spirochetes

Cocci



400x

Bacilli

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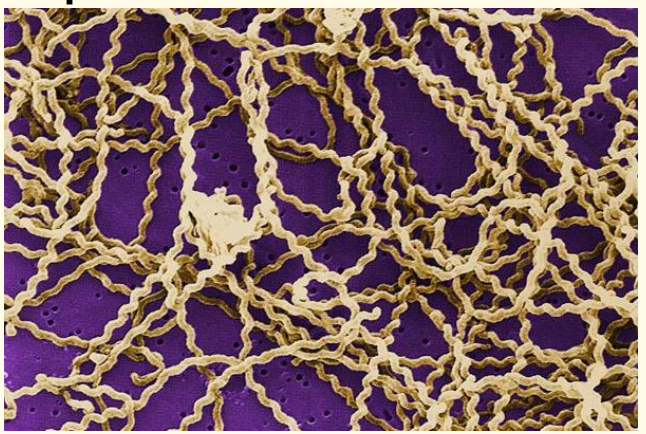
Spirochetes



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18.1 Bacteria

Cell Walls

- Eubacterial cells have peptidoglycan.
- Dyes added to the bacteria identify those with and those without an outer layer of lipid.

18.1 Bacteria

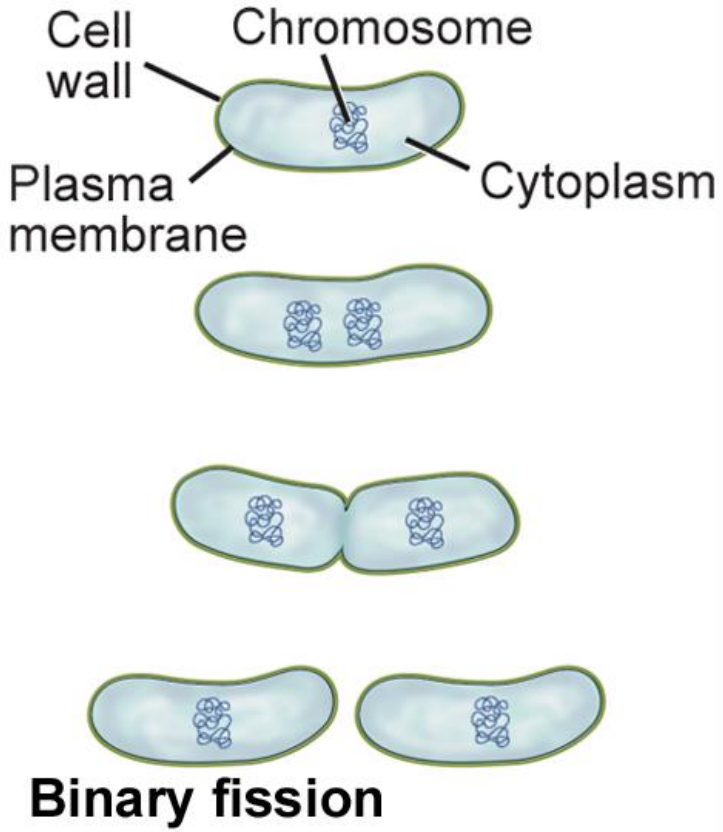
Movement

- Prokaryotic flagella are made of filaments.
- Flagella help prokaryotes to move toward materials that they need to survive.

18.1 Bacteria

Reproduction of Prokaryotes

- Binary Fission
  - Division of a cell into two genetically identical cells
- Conjugation
  - Two prokaryotes attach to each other and exchange genetic information.



Binary fission

18.1 Bacteria

Photoautotrophs

- Carry out photosynthesis in a similar manner as plants

Chemoautotrophs

- Break down and release inorganic compounds that contain nitrogen or sulfur

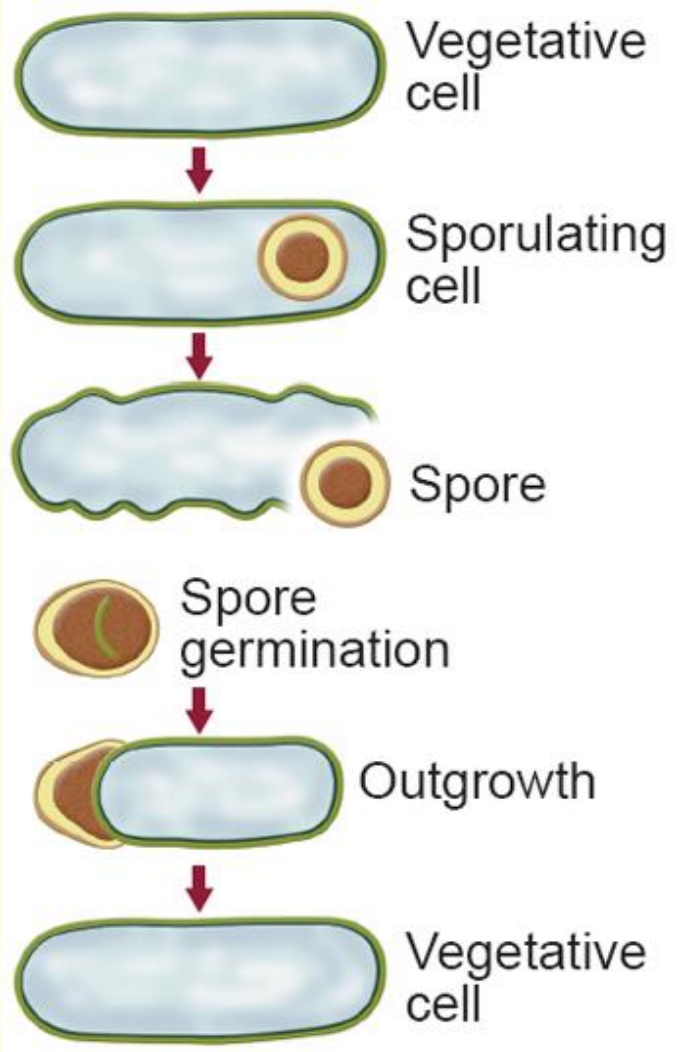
Aerobes and Anaerobes

- Obligate aerobes are bacteria that require oxygen to grow.
- Anaerobic bacteria do not use oxygen for growth or metabolism.

18.1 Bacteria

Survival of Bacteria

- Endospores
- Resistant to harsh environments and might be able to survive extreme heat, extreme cold, dehydration, and large amounts of ultraviolet radiation



18.1 Bacteria

Mutations

- Bacteria reproduce quickly and their population grows rapidly.
- Mutations lead to new forms of genes, new gene combinations, new characteristics, and genetic diversity.

18.1 Bacteria

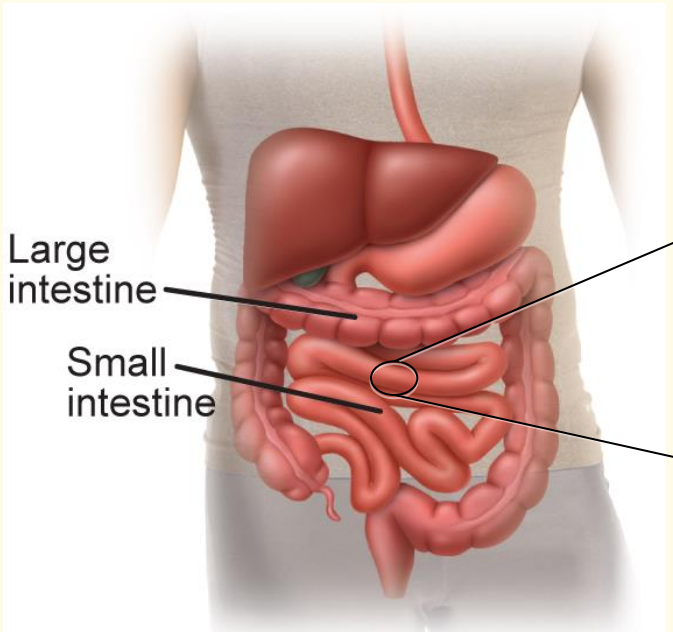
Ecology of Bacteria

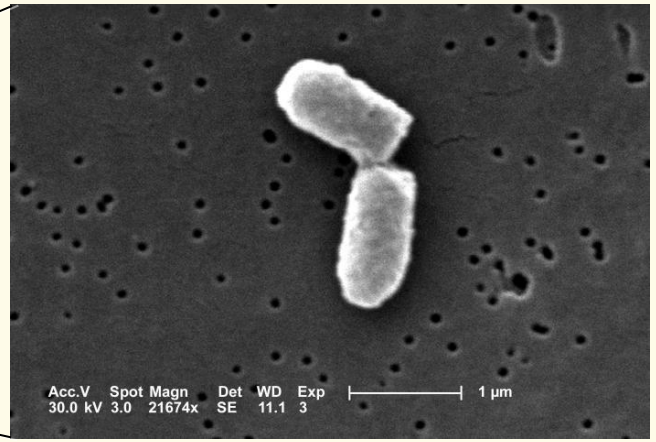
- Nutrient cycling and nitrogen fixation
  - Bacteria are decomposers, returning vital nutrients to the environment.
  - Nitrogen-fixing bacteria live in a symbiotic relationship in the root nodules of plants such as soybeans, clover, and alfalfa.

18.1 Bacteria

Normal Flora

- Most of the bacteria that live in or on you are harmless and are called normal flora.





21,674x

E. coli

18.1 Bacteria

Foods and Medicines

- Some foods are made with the aid of bacteria.
  - cheese
  - yogurt
  - buttermilk
  - pickles
  - vitamins

18.1 Bacteria

Disease-causing Bacteria

- A small percentage of bacteria cause disease.
- Bacteria multiply quickly at the site of infection.
- Bacteria secrete a toxin.

Concepts In Motion

Table 18.1 Human Bacterial Diseases

Category	Disease
Sexually transmitted diseases	_____ , gonorrhea , _____
Respiratory diseases	_____ , pneumonia , _____ , _____ ,
Skin diseases	_____ , _____ , infections of wounds or burns
Digestive tract diseases	_____ , many types of food poisoning, _____
Nervous system diseases	Botulism, _____ , _____
Other diseases	_____ , typhoid fever

tuberculosis	anthrax	Acne	boils
Syphilis	chlamydia	tetanus	bacterial meningitis
Gastroenteritis	cholera	Lyme disease	whooping cough

Drag each option to its corresponding category

Reset Submit Show me

18.2 Viruses and Prions

Viruses

- A nonliving strand of genetic material within a protein coat
- No organelles to take in nutrients or use energy
- Cannot make proteins
- Cannot move
- Cannot replicate on their own
- Most viruses range in size from 5 to 300 nanometers.

18.2 Viruses and Prions

Virus Origin

- Viruses came from parts of cells.
- Genetic material of viruses is similar to cellular genes.

18.2 Viruses and Prions

Viral Infection

- In order to replicate, a virus must enter a host cell.
- The virus attaches to the host cell using specific receptors on the plasma membrane.
- Many viruses cannot be transmitted between different species.

Concepts In Motion

Table 18.2 Human Viral Diseases

Category	Disease
	AIDS (HIV), genital herpes
	Measles, mumps, chicken pox
	Common cold, influenza
	Warts, shingles
	Gastroenteritis
	Polio, viral meningitis, rabies
	Smallpox, hepatitis

Sexually transmitted diseases | Skin diseases | Childhood diseases

Respiratory diseases | Digestive tract diseases | Other diseases

Nervous system diseases

Drag each option to its corresponding disease

Reset Submit Show me

18.2 Viruses and Prions

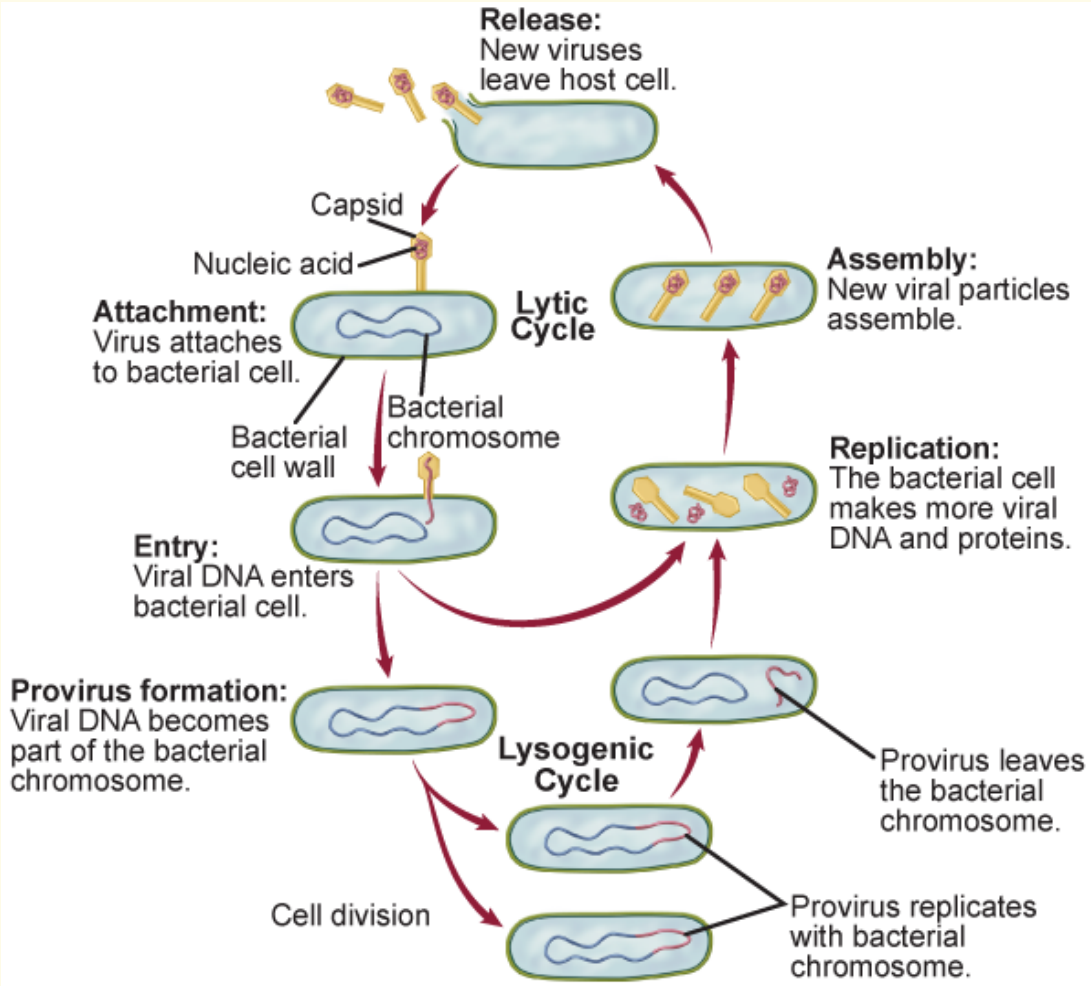
Lytic Cycle

- The host cell makes many copies of the viral RNA or DNA.

Lysogenic Cycle

- Viral DNA inserts, or integrates into a chromosome in a host cell.
- Infected cell will have the viral genes permanently.

18.2 Viruses and Prions



Concepts In MOtion Animation

Visualizing Viral Replication

Click here to proceed!

18.2 Viruses and Prions

Retroviruses

- Viruses that have RNA instead of DNA for their genetic material
- Retroviruses have a protein capsid.
- Lipid envelope is obtained from the plasma membrane of a host cell

Concepts In Motion Animation

HIV Replication

Click here to proceed!

18.2 Viruses and Prions

Prions

- Protein that can cause infection or disease is called a proteinaceous infectious particle, or prion.
- Prions normally exist in cells.
- Associated with diseases known as transmissible spongiform encephalopathies

Chapter Resource Menu

Click on a hyperlink to view the corresponding lesson.

Chapter Diagnostic Questions

CheckPoint

What type of bacteria exists in salty environments, such as the Great Salt Lake?

A. eubacteria
B. halophiles
C. methanogens
D. thermoacidophiles

Chapter Diagnostic Questions

CheckPoint

Name the structures on the outer surface of a bacterium that serve as a bridge between cells.

A. flagella

B. plasma membrane

C. pili

D. ribosomes

Chapter Diagnostic Questions

CheckPoint

How do saprotrophs obtain energy?

A. photosynthesis

B. consuming oxygen

C. produce their own food

D. decompose organic material

18.1 Formative Questions

CheckPoint

In which domain are the eubacteria?

A. Archaea

B. Bacteria

C. Eukarya

D. Protista

18.1 Formative Questions

CheckPoint

Which group of organisms includes thermoacidophiles, halophiles and methanogens?

A. adenobacteria

B. archaebacteria

C. bacteria

D. chemoautotrophs

18.1 Formative Questions

CheckPoint

What material is found in eubacteria but not in archaebacteria?

A. lipid

B. peptidoglycan

C. ribosomal protein

D. RNA

18.1 Formative Questions

CheckPoint

What cell structure helps shelter bacteria from the effects of antibiotics?

A. capsule

B. nucleoid

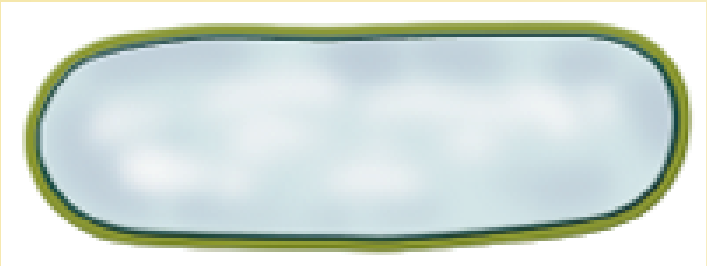
C. plasmid

D. plasma membrane

18.1 Formative Questions

CheckPoint

What is the term for bacteria that have this shape?



A. bacilli

B. cocci

C. pili

D. spirilli

18.1 Formative Questions

CheckPoint

What occurs during conjugation?

A. attachment to a host cell
B. production of offspring
C. spore germination
D. transfer of genetic material

18.2 Formative Questions

CheckPoint

Why are viruses considered to be nonliving?

A. They act as parasites in cells.

B. They are too small to be alive.

C. They cannot replicate on their own.

D. They do not contain genetic material.

18.2 Formative Questions

CheckPoint

True or False

Smallpox has been eliminated worldwide and routine vaccination for the disease has stopped.

18.2 Formative Questions

CheckPoint

What type of virus inserts RNA and reverse transcriptase into cells?

A. adenovirus

B. bacteriophage

C. prion

D. retrovirus

18.2 Formative Questions

CheckPoint

What infectious agent causes mad cow disease?

A. bacteria

B. endospore

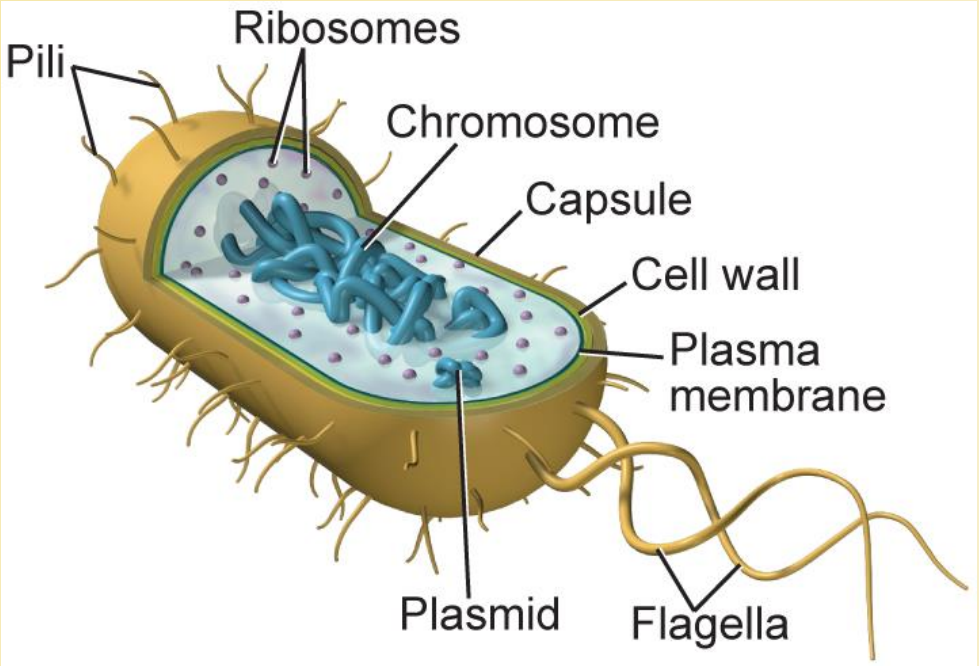
C. prion

D. virus

Chapter Assessment Questions

CheckPoint

Identify the structure of this prokaryotic cell that prevents it from drying out.



Chapter Assessment Questions

CheckPoint

A. ribosomes

B. plasma membrane

C. pili

D. capsule

Chapter Assessment Questions

CheckPoint

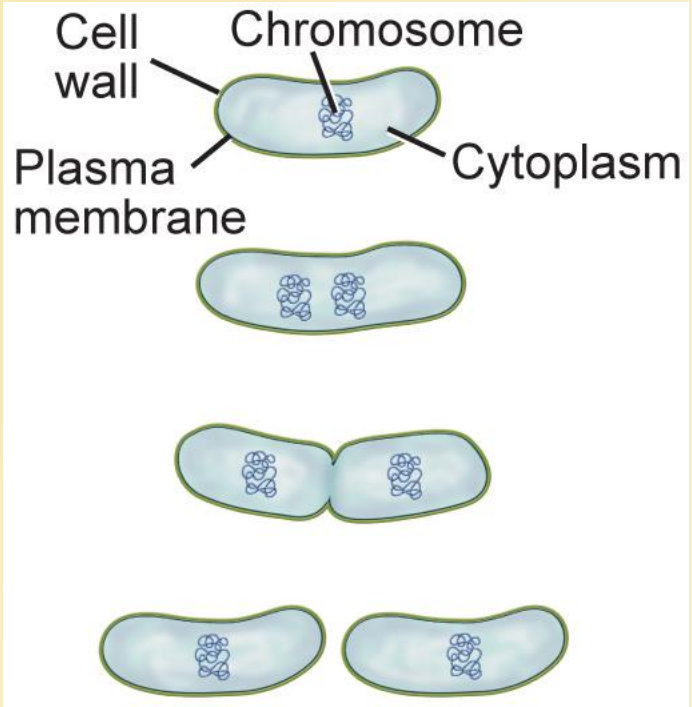
What process of reproduction is shown here?

A. nuclear fusion

B. conjugation

C. binary fission

D. budding



Chapter Assessment Questions

CheckPoint

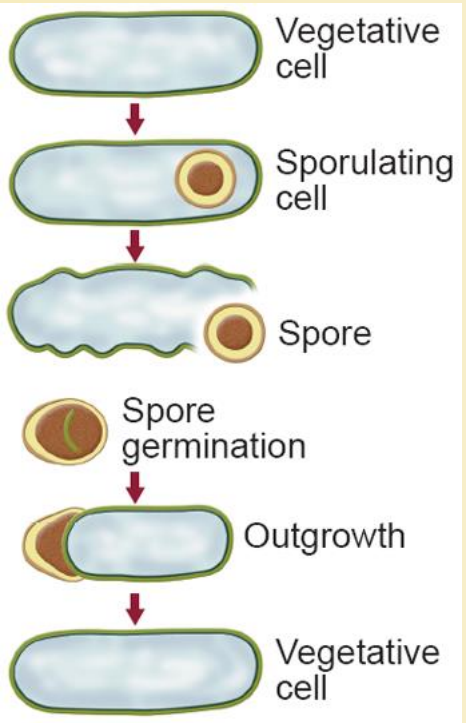
Use the figure to determine what process this bacterial cell is undergoing.

A. mutation

B. endospore production

C. reproduction

D. photosynthesis



Standardized Test Practice

CheckPoint

Before prescribing an antibiotic, what does a physician need to know about the bacteria causing the infection?

A. the shape of the bacteria

B. the type of cell wall the bacteria have

C. the type of pili and flagella the bacteria have

D. whether they are eubacteria or archaebacteria

Standardized Test Practice

CheckPoint

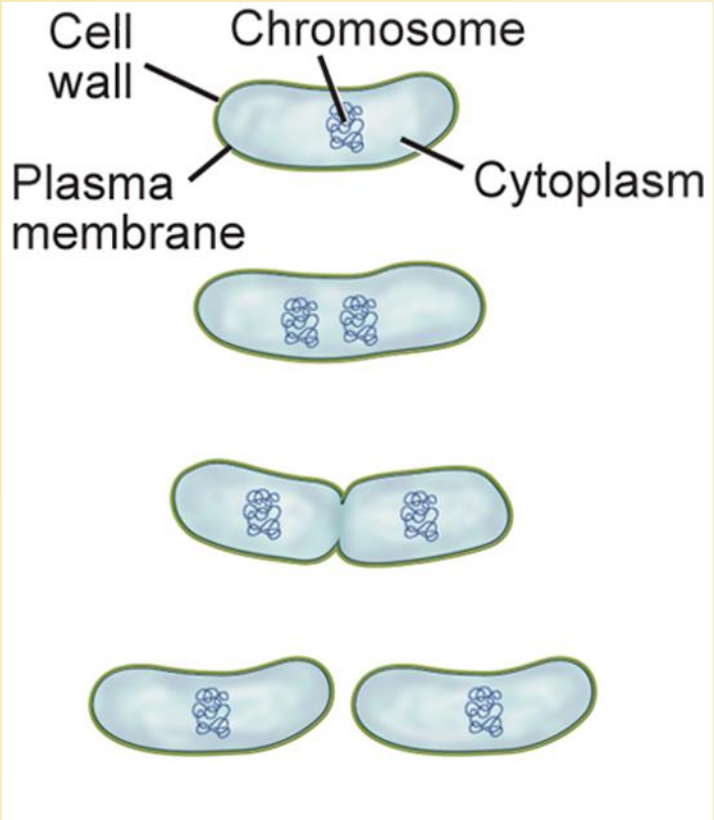
What process is taking place here?

A. mitosis

B. conjugation

C. binary fission

D. endospore formation



Standardized Test Practice

CheckPoint

Which type of prokaryotes are most likely to be found in the deepest depths of the ocean?

A. chemifacultrophs

B. chemoautotrophs

C. obligoheterotrophs

D. photoautotrophs

Standardized Test Practice

CheckPoint

What survival characteristic of bacteria has required the development of new and harsher antibiotics for fighting bacterial infections?

A. endospore formation

B. fast population growth

C. high mutation rate

D. rapid reproduction

Standardized Test Practice

CheckPoint

Why would you *not* want your mouth to be free of bacteria?

A. They break down the sugar that causes cavities.

B. They compete with harmful bacteria that cause disease.

C. They produce useful enzymes for digestion.

D. They produce vitamins that your body needs.

Standardized Test Practice

CheckPoint

For which virus is there not yet a vaccine?

A. HIV
B. polio
C. rabies
D. smallpox

Standardized Test Practice

CheckPoint

What type of infection is caused by a virus that replicates by the lysogenic cycle?

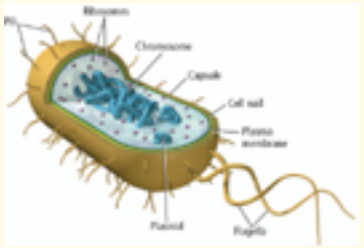
A. active infection

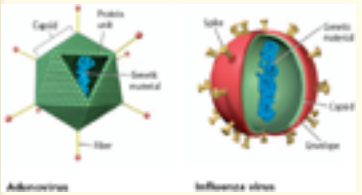
B. passive infection

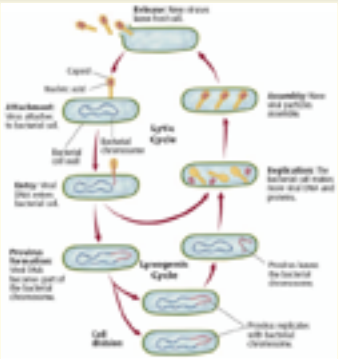
C. advanced infection

D. latent infection

Glencoe Biology Transparencies







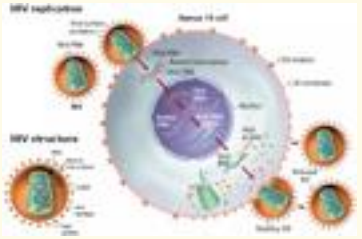
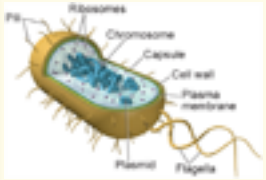
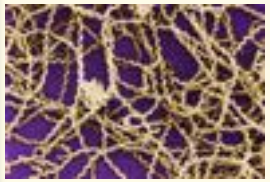
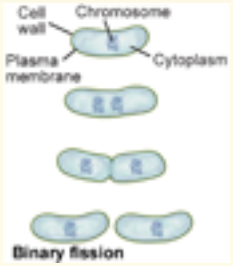
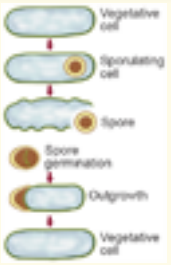


Image Bank

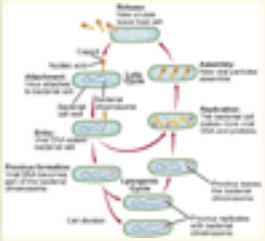

Ribosomes
Pili
Chromosome
Capsule
Cell wall
Plasma membrane
Plasmid
Flagella




Cell wall
Chromosome
Plasma membrane
Cytoplasm
Binary fission


Vegetative cell
Sporulating cell
Spore
Spore germination
Outgrowth
Vegetative cell


Large intestine
Small intestine



Vocabulary

Section 1

- bacteria
- nucleoid
- capsule
- pilus
- binary fission
- conjugation
- endospore

Vocabulary

Section 2

- virus
- capsid
- lytic cycle
- lysogenic cycle
- retrovirus
- prion

Animation

Concepts In Motion

- Visualizing Viral Replication
- HIV Replication